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TUBERCULOSIS IN INUIT

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Abstract—Tuberculous infection was first introduced to the majority of the Inuit (Eskimos) in the first half of this century. In the 1950s tuberculosis became a grave problem with the mortality rate approaching 1% per annum and the incidence rate almost 3%. The annual risk of infection has been estimated at 25% per annum. These are probably the highest rates recorded anywhere in the world in the 20th century.

Some 20–30 years ago, an intensive case-finding programme as well as a treatment programme began in all three jurisdictions where the Inuit live (northern Canada, Alaska and Greenland). The preventive measures differed; Alaska relying mainly on chemoprophylaxis and Greenland on BCG vaccination, while Canada adopted both measures. Over the last 20 years, the rates fell rapidly with the mortality rate approaching zero, and the morbidity (incidence) rate falling (Canadian Inuit) by the record 14% per annum.

The high rates in the Inuit were, in part, an expression of the lack of 'natural' resistance acquired by other races through the exposure to tubercle bacilli for many generations. Over-crowding in igloos and frequent starvation among those Inuit who relied on cariboo meat, undoubtedly contributed a great deal to the gravity of the problem. The rapid decline of the rates is without doubt primarily caused by the intensive tuberculosis programme and the compliance of the Inuit with the demands of this programme; better housing and in some cases, improved nutrition doubtlessly also played a part.

Key words: Tuberculosis, Inuit, Epidemiology, Case-finding, Treatment, Chemoprophylaxis, BCG vaccination, Primary disease, Relapse.

Inuit (Eskimos) have lived on the Arctic shores of North America (Alaska, northern Canada and Greenland) for probably several thousands of years. They have adapted to the harsh conditions of the north and relied completely on hunting and fishing for all their needs. This necessitated a nomadic type of existence for the small groups. Canadian Inuit had only sporadic contact with white people during the 19th and the beginning of the 20th centuries. During the past 50 or so years, increasing numbers of white people travelled to the north and some became residents of the Canadian Arctic region, prompted by varied reasons such as missionary zeal, defence, establishment and maintenance of the Distant Early Warning Line, and exploitation of oil and other minerals. All these led also to the profound change in the Inuit lifestyle manifested by the development of settlements accommodating larger groups of Inuit living in white man's houses and eating white man's food. Establishment of the settlements led to a further increase in the influx of white people to provide services such as schools, nursing stations, police, shops and administration.

The whites also brought with them their diseases, many of which were new to the Inuit; probably the most important among these new diseases was tuberculosis.

The early travellers to the North generally described the Inuit as a healthy race and M'Lean [1] in 1847 reported that "no epidemic diseases as far as I could learn are known among them". However, occasional cases of tuberculosis may have occurred at that time. Captain Parry, for instance, describes a consumptive-looking Eskimo boy taken on his ship in 1823 [2]. Bernier [3], in 1909, describes Inuit as initially healthy people who, however, since coming in contact with outside people, have contracted various diseases; he specifically mentions measles, typhoid fever, pneumonia, pleurisy, and syphilis but does not mention tuberculosis. Grenfell [4], who visited 5 stations of the Moravian Brethren in Labrador in 1893 found among the Inuit 'a great deal' of tuberculosis. Similarly Turner [5], in 1894, found in Fort Chimo that half of the Eskimos die of pulmonary troubles. It should be noted that both Labrador and Fort Chimo had a fairly long history of contact with the whites.

Of great interests are the findings of Rabinowitch [6] who, in 1936, found that tuberculosis was very

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common in certain settlements, while in others he found no cases of the disease; some of these latter settlements, apparently free of tuberculosis in the 1930s, showed extremely high rates of the disease 20 years later.

Although there have been some scattered epidemiological data relating to tuberculosis prior to 1950, meaningful measurements of tuberculosis in the form of reliable mortality and morbidity rates did not start until the 1950s and 1960s.

TUBERCULOSIS RATES IN THE 1950s

Table 1 shows mortality and morbidity rates, together with the risk of tuberculosis infection among Inuit in Alaska, Canada and Greenland. These rates are the highest recorded in the world in modern times. The incidence of active tuberculosis in Canadian Inuit in 1960 was four times greater than in North American Indians, and 40 times greater than that observed in the rest of Canadians.

TUBERCULOSIS CONTROL PROGRAMME

In the 1950s and 1960s comprehensive tuberculosis programmes were introduced in all three jurisdictions—Alaska, Canada and Greenland. They were all based on the intensive case finding and thorough treatment of active cases in hospitals and sanatoria, often a long distance away from the Arctic. The preventive programme differed in the three countries, Greenland relying mainly on BCG vaccination, Alaska on chemoprophylaxis, and Canada, where a comprehensive programme started a few years later in the 1960s, employed BCG as well as chemoprophylaxis. The programmes were very intensive; in Canada for instance the whole Inuit population was screened for tuberculosis annually, and sometimes even semi-annually.

TUBERCULOSIS SITUATION IN THE 1970s

Epidemiological indices (mortality, morbidity and infection rates) in Inuit in the 1970s are shown in Table 1. It is quite obvious that there has been a very dramatic decline of tuberculosis in the relatively short space of two decades. This decline has been much faster than any recorded elsewhere in the world. For instance, the incidence of active disease has been falling at the rate of 14% per annum among Inuit whilst the corresponding rate of decline in the total Canadian population is about 4–5%.

MECHANISM UNDERLYING THE DECLINE OF TUBERCULOSIS

There is little doubt that the main reason for the rapid decline of tuberculosis in Inuit is the substantial lowering of the chances of infection in the community. This is manifested in a variety of ways:

(1) The decline of the incidence rate of active disease was more rapid among the younger than the older age groups; comparing for instance the rates of bacteriologically proven tuberculosis between 1960 and 1974 the magnitude of the decline was 96% in children under 15, 82% in young adults between 15 and 24, but only 21% in adults over the age of 35 [11].

(2) Primary tuberculosis had become relatively uncommon. In the early 1970s 6.4% of all cases of tuberculosis in Inuit were accounted for by primary tuberculosis, a rate similar to the 4.9% seen in the white population born in Canada. In the Indians, on the other hand, in whom tuberculosis was still not well controlled the corresponding proportion was 23.2%.

(3) The estimated incidence of tuberculosis infection (risk of infection) had also shown a dramatic fall (Table 1).

Thus, within the relatively short space of time of about 20 years, the situation has changed dramatically. At the beginning of this period it was almost

Table 1. Annual tuberculosis mortality, morbidity and infection rates in Inuit (Alaska, Canada, Greenland)

	1950s rate (%)	1970s rate (%)	Ref.
Mortality	0.7–1.0	0–0.01	[7, 8]*
Morbidity incidence	1.5–2.9	0.06–0.17	[8–11]†
Infection incidence	18–25	0.10–4.20	[8, 11, 12]

* Also, Health and Welfare Canada (personal communication).
† Also, R. I. Fraser (personal communication).

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impossible for an Inuit child to escape being infected with tubercle bacilli; at the end it was difficult to acquire this infection. This lack of opportunity to meet tubercle bacilli in one's environment has resulted in substantial reduction of cases originating as the direct result of primary infection; it has also reduced the number, probably never very large, arising as a result of superinfection.

REACTIVATIONS (RELAPSES)

A substantial proportion (varying between 10 and 30%) of all active cases occurred in individuals who previously received treatment for tuberculosis with apparent recovery. The pattern of reactivation of tuberculosis among Inuit was carefully studied by Chan-Yeung and others [13] who found that the risk of relapse was fairly small during the first few years after the 'recovery' from the original disease but, surprisingly, increased steadily, reaching a peak of 2.2% after 12 years. This is different to reactivations in white patients which tend to occur more frequently early after completion of treatment for the original episode of the disease. In about 80% of reactivated cases in Inuit, bacilli were found to be still fully sensitive to anti-tuberculous drugs.

ABSENCE OF RISK GROUPS

The total Inuit population was divided into various 'epidemiological' groups [11] such as those with inactive tuberculosis, those with positive tuberculin reaction, those with history of BCG vaccination, etc. It was found that the risk of developing active tuberculosis was high in all the groups varying from about 0.2 to 0.8% per annum. Although this four-fold difference in the risk is quite important it is smaller than that seen in white populations where the differences in the risk of development of disease in different 'epidemiological' groups may be of the order of 30 times. It therefore seemed unjustified to talk about high and low risk groups in Inuit populations; being an Inuk almost automatically places one into a high risk group compared with Canadian compatriots.

DISCUSSION

Inuit, like many aboriginal peoples before them, paid dearly for their contact with European civilization by acquiring diseases of white men. Among these diseases tuberculosis took the heaviest toll, killing probably 1% or more of Inuit every year; fatalities due to viral infections such as measles have also been very high. Natural resistance, acquired by the races exposed to tubercle bacillus through many generations, is obviously lacking in people exposed for the first time. This is one explanation of the heavy morbidity and mortality among 'primitive' people. It is tempting to suspect that this low natural resistance may lie in poor cellular immunity, as suggested by Reece and Bratton [14]. Undoubtedly other factors, such as nutrition played a part in determining the outcome of the encounter of an individual Inuk with the tubercle bacillus. Schaeffer [15] found that in some settlements relying mainly on seal meat and fish, which were always plentiful, both the mortality and the morbidity from tuberculosis was lower than in groups of Inuit relying on cariboo meat for their food supply. There was a catastrophic decline in the herds of cariboo between 1920 and 1950 with consequent starvation and undernutrition of the latter groups of Inuit.

The main credit for the rapid decline of tuberculosis in the past two decades must go to specific tuberculosis-control programmes and to the excellent cooperation of the Inuit with various requirements of these programmes. While all the individual components of the tuberculosis programmes played a part in achieving the success it was, undoubtedly, the case finding combined with thorough treatment which was of greatest importance. New cases of tuberculosis were diagnosed so rapidly that they were largely denied the opportunity of infecting others. An important contribution to the reduction of infection was also made by the transition from living in very crowded igloos to less crowded houses. The story of tuberculosis in Inuit shows that it is possible to bring under control a disease like tuberculosis within a relatively short space of time.

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